

MATERIAL SAFETY DATA SHEET

SRM Supplier: National Institute of Standards and Technology
Standard Reference Materials Program
Gaithersburg, Maryland 20899

SRM Number: 1677c
MSDS Number: 1677c
SRM Name: Carbon Monoxide in Nitrogen
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SECTION I. MATERIAL IDENTIFICATION

Material Name: Carbon Monoxide in Nitrogen

Description: This SRM is a mixture of carbon monoxide in nitrogen provided as a compressed gas in a DOT 3AL specification aluminum (6061 alloy) cylinder equipped with a CGA-350 brass valve at a nominal pressure of 12.4 MPa (1800 psi). This cylinder provides the user with 0.73 m³ of useable mixture at NTP. NIST recommends that this cylinder not be used below 0.7 MPa (100 psi).

Other Designations: Carbon Monoxide (coal gas) in Nitrogen

Name	Chemical Formula	CAS Registry Number
Carbon Monoxide	CO	630-08-0
Nitrogen	N ₂	7727-37-9

DOT Classification: Nonflammable Gas (due to the small concentration of carbon monoxide), UN1956

Manufacturer/Supplier: Available from a number of suppliers

SECTION II. HAZARDOUS INGREDIENTS

Hazardous Components	Nominal Concentration	Limits and Toxicity Data
Carbon Monoxide	10 µmol/mol	ACGIH TLV-TWA: 25 mg/kg (29 mg/m ³)
		OSHA PEL-TWA: 50 mg/kg (55 mg/m ³)
		Man, Inhalation: TC _{LO} : 600 mg/m ³ /10 min
		Man, Inhalation: LC _{LO} : 4000 mg/kg
		Rat, Inhalation: LC ₅₀ : 1807 mg/kg/4 h
Nitrogen	Balance	Simple Asphyxiant

SECTION III. PHYSICAL/ CHEMICAL CHARACTERISTICS

Carbon Monoxide	Nitrogen
Appearance and Odor: a colorless, odorless gas	Appearance and Odor: a colorless gas
Boiling Point: 1.01325×10^5 Pa (1 atm) -192 °C	Formula Weight: 28.02
Freezing Point: -199 °C	Boiling Point: -195.8 °C
Vapor Pressure: 1.01325×10^5 Pa (1 atm) at -191 °C	Density: 1.2506 g/L at 0 °C
Vapor Density (Air = 1): 0.968	Freezing Point: -210 °C
Solubility in Water: 2.3 % at 20 °C	Solubility in Water: 1.6 % at 20 °C
Density: 1.25 g/L at 0 °C	Solubility in Other Compounds: soluble in liquid ammonia; slightly soluble in alcohol

NOTE: Physical and chemical data on this gas mixture do not exist. The data provided above is for pure nitrogen and pure carbon monoxide.

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

Flash Point: Nonflammable **Method Used:** Not applicable **Autoignition Temperature:** Not applicable

Flammability Limits in Air (Volume %): **UPPER:** Not applicable
LOWER: Not applicable

Extinguishing Media: Use extinguishing media that is appropriate to the surrounding fire.

Special Fire Procedures: Fire fighters should wear a self-contained breathing apparatus (SCBA) with a full facepiece. Keep fire exposed cylinders cool with water spray. If possible, stop the product flow.

Unusual Fire and Explosion Hazards: Cylinder rupture may occur under fire conditions. **DO NOT** expose to heat or flames.

SECTION V. REACTIVITY DATA

Stability: **X** **Stable** **Unstable**

Conditions to Avoid: Storage in poorly ventilated areas or near a heat source. Cylinder temperature should not exceed 52 °C.

Incompatibility (Materials to Avoid): Nitrogen reacts with lithium, neodymium, and titanium at high temperatures. Toxic carbon monoxide should be kept from strong oxidizing agents, halogens, and metal oxides.

See Section IV: *Unusual Fire and Explosion Hazards*

Hazardous Decomposition or By Products: Carbon dioxide is produced from carbon monoxide.

Hazardous Polymerization:	Will Occur	X	Will Not Occur
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SECTION VI. HEALTH HAZARD DATA

Route of Entry: X **Inhalation** **Skin** **Ingestion**

Inhalation Effects: If released in a confined area, this product may displace oxygen and result in asphyxia.

Inhaled carbon monoxide binds with blood hemoglobin to form carboxyhemoglobin. Carboxyhemoglobin can not take part in normal oxygen transport, greatly reducing the blood's ability to transport oxygen. Depending on levels and duration of exposure, symptoms may include headache, dizziness, heart palpitations, weakness, confusion, nausea, and even convulsions with eventual unconsciousness and death.

Medical Conditions Generally Aggravated by Exposure: Not Available

Listed as a Carcinogen/Potential Carcinogen:

	Yes	No
In the National Toxicology Program (NTP) Report on Carcinogens	<u> </u>	<u> X </u>
In the International Agency for Research on Cancer (IARC) Monographs	<u> </u>	<u> X </u>
By the Occupational Safety and Health Administration (OSHA)	<u> </u>	<u> X </u>

EMERGENCY AND FIRST AID PROCEDURES:

Skin Contact: None required

Eye Contact: None required

Inhalation: This is the primary route of exposure. If inhaled, move victim to fresh air. If breathing is difficult, give oxygen; if victim is not breathing, give artificial respiration. Obtain medical assistance. Prompt medical attention is mandatory in all cases of overexposure to carbon monoxide.

Ingestion: Not applicable

TARGET ORGAN(S) OF ATTACK: Mucous membranes, upper respiratory tract, eyes, and skin

SECTION VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material Is Released or Spilled: Notify safety personnel of major carbon monoxide leaks or spills. Minor leaks (which are dangerous in enclosed areas) can be detected by painting the suspected area of leakage with a soap solution; bubbling indicates leaks. Evacuate area and keep personnel upwind. Emergency personnel should wear full protective equipment, such as self-contained or air-supplied breathing apparatus. Remove leaking cylinder to exhaust hood or safe outdoors area.

Waste Disposal: **DO NOT** reuse the empty cylinder; it will contain hazardous material. Follow federal, state and local regulations. Contact your local supplier or a licensed contractor.

Handling and Storage: Wear appropriate NIOSH approved respirator, chemical resistant gloves and other protective clothing. **WARNING:** Air-purifying respirators will not protect workers in an oxygen deficient environment. Safety shoes are recommended for those handling cylinders of gases. Use only in a chemical fume hood. Safety shower and eye bath should be available. Do not breath the gas, get the material into the eyes or on the skin or clothing. Avoid prolonged or repeated use. Wash thoroughly after use.

NOTE: Contact lenses pose a special problem; soft lenses may absorb irritants and all lenses concentrate them. **DO NOT** wear contact lenses in the laboratory.

Do not allow cylinder temperature to exceed 52 °C and use only with equipment rated for cylinder pressure. Close valve when not in use only with equipment rated for cylinder pressure. Close valve when not in use and when cylinder is empty. Make sure cylinder is properly secured when in use or stored.

SECTION VIII. SOURCE DATA/ OTHER COMMENTS

Sources: BOC Gases, MSDS G-136, *Carbon Monoxide in Nitrogen* 0.00005 % to 10 %, 07 June 1999.
MDL Information Systems, MSDS *Carbon Monoxide*, 10 September 1998.
MDL Information Systems, MSDS *Nitrogen*, 02 June 1999.

NOTE: Physical and chemical data contained in this MSDS are provided for use in assessing the hazardous nature of the material. The MSDS was prepared carefully, using current references; however, NIST does not certify the data on the MSDS. The certified value for this material is given only on the NIST Certificate of Analysis.